

REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the above amendments and the following remarks.

At the outset, the Applicants wish to thank the Examiner for the courtesy shown to their attorney during a telephone interview on July 14, 2010. The participants were Examiner Kassa and Douglas Agopsowicz, Reg. No. 56,792. The following includes a summary of the substance of the interview. No agreement was reached.

During the interview, the discussion focused on the rejections of claims 35-49 made in the Office Action mailed May 14, 2010, and particularly on claims 43-46. The prior art references WO 03/047118 to Gupta et al. and U.S. Printed Publication No. 2003/0105996 to Dagan et al. were discussed. Claims 35-49 were withdrawn from issue in view of the newly discovered reference(s) to Gupta (WO/03/047118) (hereinafter, “Gupta”), cited in an IDS submitted on March 15, 2010. In the rejection, claims 43-45 were rejected under 35 U.S.C. § 102(b) as being anticipated by Gupta. Claims 46-49 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gupta (WO 03/047118 A2) in view of Dagan (US 2003/0105996) (hereinafter, “Dagan”). Claims 35-42 “are similarly analyzed as claims 43-49,” and so are presumably rejected as being either anticipated under 35 U.S.C. § 102(b) as being anticipated by Gupta, or being unpatentable over Gupta in view of Dagan.

The Applicant’s representative argued that the various rejections should be withdrawn for the following reasons.

By way of review, claim 43 is directed towards a transmission apparatus and recites the features of:

“43. (New) A transmission apparatus comprising:

an interleaver that:

stores a first data sequence, and a second data sequence that is different from the first data sequence, the first and second data sequences being encoded, transmitting data sequences;

interleaves the first data sequence into a first interleaved data sequence using a first interleaving pattern in which an output order pattern of the first data sequence is different from an input order pattern of the first data sequence; and

interleaves the second data sequence into a second interleaved data sequence using a second interleaving pattern in which an output order pattern of the second data sequence is different from the output order pattern of the first data sequence;

a modulator that:

modulates the first interleaved data sequence into a first modulated symbol; and

modulates the second interleaved data sequence into a second modulated symbol; and

a transmitter that:

generates a first orthogonal frequency division multiplexing symbol mapped over a plurality of subcarriers, from the first modulated symbol;

generates a second orthogonal frequency division multiplexing symbol mapped over a plurality of subcarriers, from the second modulated symbol;

transmits the first orthogonal frequency division multiplexing symbol from a first antenna in a specific frequency band and time; and

transmits the second orthogonal frequency division multiplexing symbol from a second antenna in the specific frequency band and time, shared in common with the first orthogonal frequency division multiplexing symbol (emphasis added)."

The Office Action alleges that Gupta discloses these underlined features at "FIG. 2B 214a" and "FIG. 2B 214t." (See Office Action, page 3, item 4). During the interview, Examiner Kassa argued that paragraph [0038] of Gupta discloses this recited feature. Paragraph [0038]

discloses the following:

“The coded bits from each encoder 212 are then provided to a respective channel interleaver 214, which interleaves the coded bits based on a particular interleaving scheme to provide diversity. Channel interleavers 214a through 214t then provide to modulator 116B  $N_T$  interleaved and coded data streams for the  $N_T$  transmit antennas.”

During the interview, Examiner Kassa emphasized that, in his opinion, the phrase “particular interleaving scheme” as disclosed in paragraph [0038] referred to different interleaving schemes for each of the interleavers 214a through 214t (FIG. 2B of Gupta). Examiner Kassa further referred to paragraph [0035] of Gupta, which discloses:

“In this embodiment, a particular coding scheme is used for each of the  $N_T$  transmit antennas and a particular modulation scheme is used for all  $N_F$  frequency subchannels of each transmit antenna (i.e., separate coding and modulation on a per-antenna basis)”

Examiner Kassa argued that paragraph [0035] of Gupta supported his position that the word “particular,” as used in Gupta, is synonymous with the word “different.”

In response, the Applicant’s representative disagreed that the word “particular” is synonymous with the word “different,” and argued that the context of the sentence should be considered. The Applicant’s representative noted that Gupta discloses, in paragraph [0038], using a (in the singular) “particular” interleaving scheme in interleavers 214a to 214t in FIG. 2B, and that nothing in paragraph [0038] or any other section of Gupta actually disclosed that the “particular” interleaving scheme in Gupta referred to a plurality of different interleaving schemes.

The Applicant’s representative further noted that paragraph [0035] of Gupta referred to “separate coding and modulation on a per-antenna basis,” while paragraph [0038], which refers to a “particular interleaving scheme,” does not use the word “separate” anywhere. The

Applicant's representative noted that a comparison of these two paragraphs suggests that Gupta did not intend the phrase "particular interleaving scheme" to refer to separate interleaving schemes, because Gupta did not modify the description of the "particular interleaving scheme" with the phrase "separate" anywhere (in contrast with par. [0035]). In response, Examiner Kassa disagreed with this interpretation of Gupta.

The Applicant's representative further argued that paragraph [0038] of Gupta does not even mention "output order patterns," as recited by claim 43. In response, Examiner Kassa argued that the interleavers of Gupta have corresponding output order patterns.

The Applicant's representative further argued that Gupta does not disclose the recited modulator of claim 43. In response, Examiner Kassa disagreed and argued that FIG. 2B of Gupta disclosed a modulator.

With respect to claim 44, a dependent claim depending on claim 43, Examiner Kassa argued that Gupta's paragraph [0039] disclosed each feature of claim 44. The Applicant's representative argued that paragraph [0039] does not even mention a number of features recited by claim 44, including:

- "an amount of data interleaved by the first interleaving pattern equals an amount given by multiplying an amount of all subcarriers included in the first orthogonal frequency division multiplexing symbol and used for data transmission, by an amount of bits transmitted by one first modulated symbol";
- "an amount of data interleaved by the second interleaving pattern equals an amount given by multiplying an amount of all subcarriers included in the second orthogonal frequency division multiplexing symbol and used for data transmission, by an amount of bits

transmitted by one second modulated symbol"; or

- "the amount of data interleaved by the first interleaving pattern and the amount of data interleaved by the second interleaving pattern are the same"

The Applicant's representative asked for a specific identification of where various words in these above-recited features of claim 44 could be found in Gupta's paragraph [0039]. With respect to the phrase "an amount of data interleaved by the first interleaving pattern equals an amount given by multiplying an amount of all subcarriers...by an amount of bits transmitted by one first modulated symbol," Examiner Kassa responded that OFDM technology always uses multiplication to transmit signals. With respect to the phrase "the amount of data interleaved by the first interleaving pattern and the amount of data interleaved by the second interleaving pattern are the same,"" Examiner Kassa responded that Gupta's paragraph [0039] disclosed that "[w]ithin each OFDM modulator, symbol mapping element 222 maps groups of  $q_n$  coded bits to form  $M_n$ -ary modulation symbols," which reads on this recited feature, and further noted that each line of modulation processing uses the same amount of data. In response to these allegations, the Applicant's representative argued that nothing in paragraph [0039] appeared to teach each of these recited features of claim 44, either expressly or inherently, including for example using a "first modulated symbol" and "second modulated symbol" in a multiplication operation, that the amount of data interleaved by the first and second interleaving pattern are the same, or even the phrase "interleaving" in general, and that the Applicant's representative did not understand how these features were anticipated.

With respect to the rejection of claim 46, which was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gupta in view of Dagan, Examiner Kassa argued that FIG. 6 of Dagan discloses the feature of: "the interleaver interleaves the first orthogonal frequency division

multiplexing symbol to be transmitted from the first antenna every x symbols and interleaves the second orthogonal frequency division multiplexing symbol to be transmitted from the second antenna every y ( $x \neq y$ ) symbols,” as recited by claim 46. The Applicant’s representative responded by noting that FIG. 6 discloses dividing one input signal into a plurality of bits (a “tree structure”, see Dagan, par. [0057]), selecting blocks according to a rule, and carrying out interleaving to create one output signal, but did not disclose different interleaving patterns, and also did not disclose the features recited by claim 46.

In response, Examiner Kassa argued that interleaving generally always uses patterns, and that the tree structure disclosed by FIG. 6 of Dagan reads on the recited features of claim 46.

No agreement was reached with respect to any of pending claims 35-49.

In addition to the arguments summarized above, a more detailed explanation as to why the amended claims are patentably distinct over the prior art is included below.

#### (1) Regarding claim 43

Claim 43 recites the feature of “...an interleaver that...interleaves the second data sequence into a second interleaved data sequence using a second interleaving pattern in which an output order pattern of the second data sequence is different from the output order pattern of the first data sequence.”

In contrast with Gupta, the first interleaving pattern and second interleaving pattern recited in Applicants’ claim 43 have different output order patterns, and signals outputted from the first and second antennas are therefore interleaved using interleaving patterns of varying output order patterns. Gupta does not explicitly teach or suggest anything about different output order patterns. The Office Action does not identify where Gupta discloses this feature of claim 43. Furthermore, such a result is not inherently disclosed by Gupta. It is well established that in

order to prove inherency, it must be shown that the prior art “necessarily functions in accordance with, or includes, the claimed limitations.” MEHL/Biophile Int'l Corp. v. Milgram, 192 F.3d 1362, 1365 (Fed. Cir. 1999) (emphasis added). In this case, the Office Action does not explain how Gupta's disclosure “necessarily” results in different output order patterns, and in fact, it is entirely possible that the same output order patterns could be output from the system of Gupta.

Guptas' disclosure indicates that signals outputted from individual antennas adopt the same particular interleaving pattern. According to Gupta, the encoder type and modulation scheme are selected according to control signals received as input. However, no control signal is inputted in the interleavers, and this makes it clear that Gupta's interleavers use a particular, fixed pattern. In other words, Gupta does not disclose using varying interleaving patterns in individual interleavers.

Accordingly, the Applicants' representative noted that the rejection of claim 43 should be withdrawn for at least this reason.

## (2) Regarding claim 44

Claim 44 is a dependent claim depending from claim 43 and recites:

“The transmission apparatus according to claim 43, wherein:

an amount of data interleaved by the first interleaving pattern equals an amount given by multiplying an amount of all subcarriers included in the first orthogonal frequency division multiplexing symbol and used for data transmission, by an amount of bits transmitted by one first modulated symbol;

an amount of data interleaved by the second interleaving pattern equals an amount given by multiplying an amount of all subcarriers included in the second orthogonal frequency division multiplexing symbol and used for data transmission, by an amount of bits transmitted by one second modulated symbol; and

the amount of data interleaved by the first interleaving pattern and the amount of data interleaved by the second interleaving pattern are the same.”

As explained in the summary above, the Office Action alleges that Gupta discloses each of the features recited in claim 44 at “paragraph [0039].” (See Office Action, page 4, item 5).

However, the content of Gupta’s paragraph [0039] bears no relationship to Applicants’ claim 44. For example, paragraph [0039] does not disclose the recited features of:

- “an amount of data interleaved by the first interleaving pattern equals an amount given by multiplying an amount of all subcarriers included in the first orthogonal frequency division multiplexing symbol and used for data transmission, by an amount of bits transmitted by one first modulated symbol”;
- “an amount of data interleaved by the second interleaving pattern equals an amount given by multiplying an amount of all subcarriers included in the second orthogonal frequency division multiplexing symbol and used for data transmission, by an amount of bits transmitted by one second modulated symbol”; or
- “the amount of data interleaved by the first interleaving pattern and the amount of data interleaved by the second interleaving pattern are the same”

Moreover, paragraph [0039] of Gupta is not even directed towards describing interleaving at all, but rather is focused on describing Gupta’s modulation technique. Paragraph [0039] of Gupta, in other words, does not anticipate numerous features of claim 44.

Accordingly, the Applicants' representative argues that the rejection of claim 44 should be withdrawn for at least this reason.

(3) Regarding claim 45

As mentioned above in regards to claim 43, Gupta does not disclose providing varying interleaving patterns, and therefore mentions nothing about uncorrelated interleaving patterns. Gupta therefore fails to disclose Applicants' claim 45.

(4) Regarding claims 46-49

Claims 46-49 are dependent on claim 43 and should be withdrawn for at least the same reasons that claim 43 should be withdrawn.

Furthermore, Dagan et al. (US 20030105996) discloses, in FIG. 6, dividing one input signal into a plurality of bits (blocks), selecting blocks according to the rule given in box 400 of FIG. 4, and, as shown in FIG. 7, connecting two blocks of bits and carrying out interleaving. Dagan repeats this to create one output signal.

Dagan discloses making use of at least two patterns, that is, a pattern for rearranging divided blocks and a pattern for selecting bits upon making two selected blocks into one block. These two patterns are used in one interleaver. Dagan, in other words, discloses providing a transmitting apparatus in which one interleaver outputs one output signal in response to one input signal. Consequently, the combination of Gupta and Dagan would only provide a transmitting apparatus in which a plurality of interleavers use the same interleaving pattern.

By contrast with this, the features recited by Applicants' claim 46 provide a transmitting apparatus in which two interleavers output two output signals in response to two interleavers, and in which the two interleavers use two different interleaving patterns. Furthermore, according to Applicants' claim 46, the interleaving pattern varies between the interleavers, and interleaving processing is carried out every x symbols (first interleaving pattern) or every y symbols (second

interleaving patterns).

Accordingly, it is respectfully submitted that even if Gupta and Dagan were combined as proposed in the Office Action, these prior art references would still fail to disclose each of the recited features of claims 46-49.

Therefore, it is believed that Applicants' claims 46-49 are non-obvious over Gupta and Dagan, and it is respectfully submitted that the rejection of claims 46-49 should be withdrawn for at least these reasons.

(5) Regarding claims 35-42

It is respectfully submitted that the rejections of claims 35-42 should be withdrawn for substantially the same reasons that the rejections of claims 43-49 should be withdrawn, as set forth above.

In view of the above, it is submitted that this application is in condition for allowance, and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

/James Edward Ledbetter/

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